

REMARKS

The Final Office Action of November 3, 2004, has been received and reviewed.

Claims 1-24 are currently pending in the above-referenced application. Of these, claims 2 and 5-10 have been withdrawn from consideration as being drawn to a non-elected species of invention. Each of claims 1, 3, 4, 11-13, and 15-24, which have been considered, stand rejected. The Office has indicated that claim 14 is directed to allowable subject matter.

Reconsideration of the above-referenced application is respectfully requested.

Rejections Under 35 U.S.C. § 102(e)

Each of claims 1, 3, 11-13, and 15-24 stands rejected under 35 U.S.C. § 102(e).

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

At page 7 of the Final Office Action, the Examiner incorrectly infers that, in order for a claim to be allowable, the advantages of the subject matter recited therein must be clear. Advantages have not been described because such a description is not required by the law. Rather, the law states that a claim is patentable under 35 U.S.C. § 102 if the prior art does not expressly or inherently describe each and every element of that claim. Accordingly, the ensuing discussion, as required by the law, includes a characterization of the art upon which the Examiner has relied, as well as an explanation as to why that art is deficient in expressly or inherently describing each and every element of the claims.

Although the Examiner has suggested otherwise by posing the question, “[a]re we not to trust the eyes,” M.P.E.P. § 2125 states that illustrated drawing features are of little value in supporting a claim rejection when the specification does not indicate that the drawings may be relied upon for such a purpose. In fact, “drawings must [only] be evaluated for what they reasonably disclose and suggest to one of ordinary skill in the art.” M.P.E.P. § 2125.

Yates

Claims 15-20, 23, and 24 are rejected under 35 U.S.C. § 102(e) for reciting subject matter that is purportedly anticipated by the subject matter disclosed in U.S. Patent 6,358,793 to Yates et al. (hereinafter “Yates”).

Yates describes processes for forming localized masks within trenches that will be used to form capacitors. Such processes include, among other things, disposing a layer 40 of photoresist over the surface of a semiconductor device structure and within trenches that extend into an active surface thereof.

While Yates’s figures depict an edge of an upper surface of the photoresist layer 40, at the depicted cross-section of the semiconductor device structure, as being substantially linear, the description of Yates is silent as to whether or not the upper surface of the photoresist layer 40 is actually “substantially free of hills and valleys,” as recited in independent claim 15.

The Examiner has focused on the linear appearances of the upper surfaces of the photoresist layers 45, 70, 75 that are shown in the cross-sectional drawings of Yates (e.g., FIGs. 11, 12, and 17) in support of its assertion that the surface of the photoresist layer 40 of Yates is free of hills and valleys. M.P.E.P. § 2125, however, cautions that “drawings must be evaluated for what they reasonably disclose and suggest to one of ordinary skill in the art.” This rule is based, at least in part, upon the holding in *In re Aslanian*, 200 USPQ 500 (C.C.P.A. 1979), in which the court directed “[w]e evaluate and apply the teachings of all relevant references on the basis of what they reasonably disclose and suggested to one skilled in the art . . .” In *Aslanian*, the court was evaluating the relevance of drawings of a design patent as prior art to the claims of a utility patent application. Relative dimensions were not at issue. Therefore, it is apparent that reference to relative dimensions of features of an illustrated object in M.P.E.P. § 2125 is merely an example of something that may not be reasonably disclosed or suggested to one of ordinary skill in the art.

The C.C.P.A., in *In re Olson*, 101 USPQ 401 (1954), recognized that, unless expressly indicated, “drawings which accompany an application for a patent are merely illustrative of the principles embodied in the alleged invention claimed therein . . .” M.P.E.P. § 2125 provides further guidance on this principle by stating that illustrated drawing features are of little value in

supporting a claim rejection when the specification does not indicate that the drawings may be relied upon for such a purpose.

Yates has been relied upon for its depiction of the surface of a photoresist with straight lines. Notably, the straight lines that are shown in Yates do not represent any of the area of the surfaces of the depicted photoresist layers 45, 70, 75 but, rather, merely the edges of a surface of a cross-sectional plane that extends through photoresist layers 45, 70, 75 (*i.e.*, a single line across the surface of each photoresist layer 45, 70, 75). Before the priority date for the above-referenced application, one of ordinary skill in the art would have had no reason to believe or expect that such a straight line was representative of a planar surface. This is because, as is explained in the “Background” section of the above-referenced application and several of the references that have been made of record in the above-referenced application (*see, e.g.*, U.S. Patent 5,677,001 to Wang et al. (hereinafter “Wang ‘001”), col. 4, TABLE 1; U.S. Patent 6,117,486 to Yoshihara (hereinafter “Yoshihara”), one or ordinary skill in the art would have expected the surface of a prior photoresist layer, particularly a photoresist layer which overlies a nonplanar substrate surface, to have a variety of minuscule nonplanar features, including hills and valleys of different elevations and dimensions, angled surfaces between the hills and valleys, and the like. As those of ordinary skill in the art have recognized, such surfaces have primarily been illustrated as planar for the sake of simplicity (*see, e.g.*, Wang ‘001 and Yoshihara).

Therefore, in view of the guidance that has been provided in M.P.E.P. § 2125, without further guidance from the specification of Yates, the mere inclusion of straight lines in the simplified drawings thereof does not indicate that the surface of photoresist layer 40, which is represented by a straight line, is substantially free of hills or valleys.

Thus, Yates does not expressly or inherently describe that the surfaces of any of the photoresist layers (*e.g.*, layers 45, 70, and 75 shown in FIGs. 17, 11, and 12, respectively) thereof have surfaces which are substantially free of hills or valleys, as required of the material layer of the semiconductor device structure recited in independent claim 15 of the above-referenced application.

Therefore, it is respectfully submitted that, under 35 U.S.C. § 102(e), Yates does not anticipate each and every element of independent claim 15 and, thus, that independent claim 15 recites subject matter which is allowable over the description of Yates.

Each of claims 16-20, 23, and 24 is allowable, among other reasons, for depending either directly or indirectly from claim 15, which is allowable.

Claim 20 is further allowable since Yates neither expressly nor inherently describes a material layer (*i.e.*, either the photoresist layer or the resulting mask layer thereof) that has a thickness which is less than the depths of the containers thereof. The relative dimensions shown in the drawings of Yates cannot be relied upon since Yates does “not disclose that the drawings are to scale and is silent as to dimensions.” M.P.E.P. § 2125.

Claim 24 is additionally allowable since Yates lacks any express or inherent description that the surface of photoresist layer is substantially planar.

Kikuchi

Claims 1, 3, 11-13, 21, and 22 have been rejected under 35 U.S.C. § 102(e) for being directed to subject matter which is assertedly anticipated by the subject matter described in U.S. Patent 6,278,153 to Kikuchi et al. (hereinafter “Kikuchi”).

The description of Kikuchi is much like that of Yates. Specifically, FIG. 6D of Kikuchi shows a semiconductor device structure includes a substrate 21, multiple material layers 23-27 formed on the substrate 21, and a via-hole 23a extending downwardly into the material layers 23-27. *See also* FIGs. 6A-6C; col. 16, line 48, to col. 17, line 61. A resist 20 is then formed over the semiconductor device structure and within the via-holes 23a thereof. FIG. 6D; col. 17, line 62, to col. 18, line 2.

The specification of Kikuchi does not expressly or inherently describe that a surface of the resist 20 is substantially free of hills or valleys, as is required of the material layer of the semiconductor device structure to which independent claim 1 is drawn. Again, it is respectfully submitted that, in view of the guidance provided by M.P.E.P. § 2125, reliance upon the drawings of Kikuchi is improper, since the specification does not indicate that the features (*e.g.*, straight lines) of the simplified drawings are to be taken at face value.

In contrast to the subject matter described in Kikuchi, independent claim 1 recites a semiconductor device structure which includes a material layer disposed over a substrate, substantially filling at least one recess of the substrate, and having a surface which is substantially free of hills and valleys.

As Kikuchi is devoid of any express or inherent description that the resist layer 20 or any other layer described therein has a surface which is substantially free of hills and valleys, it is respectfully submitted that amended independent claim 1 recites subject matter which, under 35 U.S.C. § 102(e), is unanticipated by and allowable over the description of Kikuchi.

Moreover, Kikuchi repeatedly notes that the photoresist layers and other polymer layers disclosed therein have thicknesses of 10 μm . As “10 μm ” denotes a layer of uniform thickness, and since the photoresist and other polymer layers of Kikuchi overlie nonplanar surfaces, none of these layers could be substantially free of hills and valleys. Therefore, independent claim 1 is directed to subject matter which, under 35 U.S.C. § 102(e), is allowable over the subject matter described in Kikuchi.

Each of claims 3, 11-13, 21, and 22 is allowable, among other reasons, for depending either directly or indirectly from claim 1, which is allowable.

Claim 13 is additionally allowable since Kikuchi neither expressly nor inherently describes a mask material that has a thickness which is less than a depth of at least one container recessed in an insulator layer of the structure. Specifically, Kikuchi does not expressly or inherently describe that either the resist layer or the resulting mask layer of the structure disclosed therein has a thickness which is less than the depths of the via-holes 23a within which the resist is disposed. M.P.E.P. § 2125 clearly indicates that the relative dimensions shown in the drawings of Kikuchi cannot be relied upon since Kikuchi does “not disclose that the drawings are to scale and is silent as to dimensions.”

Claim 24 is additionally allowable since Kikuchi lacks any express or inherent description that the surface of photoresist layer is substantially planar.

Wang

Claims 1, 15, 16, and 21-24 stand rejected under 35 U.S.C. § 102(e) for being drawn to subject matter that is allegedly anticipated by the disclosure of U.S. Patent 6,461,932 to Wang (hereinafter “Wang”).

Wang describes a process for creating a trench-isolated semiconductor structure “using a pre-smoothing technique to avoid difficulties such as dishing and premature silicon-nitride removal that might otherwise occur during chemical-mechanical polishing...” (hereinafter

“CMP”). Col. 4, lines 48-51. While the avoidance of dishing a premature silicon nitride removal may prevent some of the nonplanarities that might occur during CMP, other types of nonplanarities may remain.

The process of Wang includes providing a dielectric layer 56 over a semiconductor surface, and covering the dielectric layer 56 with a “smoothening layer” 60. Col. 6, lines 23-28. The smoothening layer 60 has an upper smoothening surface 62 which is smoother than the upper dielectric surface 58 of the dielectric layer 56. Col. 6, lines 29-31. The smoothening layer 60 is applied either by a “deposition/spinning procedure” (col. 6, line 52, to col. 7, line 14), a “deposition/flow” procedure (col. 7, lines 15-27), or a combination of these procedures (col. 7, lines 28-41). Wang notes, at col. 6, lines 32-34, that the smoothening layer 60 may include “slight depressions in upper smoothening surface 62 at the location so of the deepest parts of the depressed portion of upper dielectric surface 58.”

Once the smoothening layer 60 has been formed, the smoothening layer 60 and the dielectric layer 56 are removed by CMP methods until a portion of the underlying semiconductor device is exposed. Col. 7, line 42, to col. 8, line 25.

Again, independent claims 1 and 15 require a material layer with a surface that is substantially free of both hills *and* valleys. As Wang teaches that the upper smoothening surface 62 of the smoothening layer 60 thereof may include “slight depressions” (*i.e.*, valleys), Wang does not expressly or inherently describe a layer that is substantially free of valleys, as would be necessary to anticipate each and every element of independent claim 1 and independent claim 15. It is, therefore, respectfully submitted that, under 35 U.S.C. § 102(e), independent claims 1 and 15 recite subject matter which is allowable over the subject matter described in Wang.

Claims 21 and 22 are both allowable, among other reasons, for depending directly from claim 1, which is allowable.

Claims 16, 22, and 23 are each allowable, among other reasons, for depending directly from claim 15, which is allowable.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 102(e) rejections of claims 1, 3, 11-13, and 15-24 be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

Claim 4 stands rejected under 35 U.S.C. § 103(a) for being directed to subject matter which is allegedly unpatentable over teachings from Kikuchi, in view of the subject matter taught in U.S. Patent 5,663,090 to Dennison et al. (hereinafter “Dennison”).

Claim 4 is allowable, among other reasons, for depending from claims 1 and 3, which are allowable. Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejection of claim 4 is respectfully requested.

Allowable Subject Matter

The indication that claim 14 recites allowable subject matter is noted with appreciation. As the claims from which claim 14 depends are also believed to be allowable, claim 14 has not been amended to independent form.

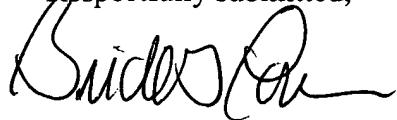
Election of Species Requirement

As each of claims 1, 3, 4, and 15-20 remains generic to all of the species of invention that have been identified by the Office, it is respectfully requested that claims 2 and 5-10 be considered and allowed. M.P.E.P. § 806.04(d).

CONCLUSION

It is respectfully submitted that each of claims 1-24 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



Brick G. Power
Registration No. 38,581
Attorney for Applicant(s)
TRASKBRITT
P.O. Box 2550
Salt Lake City, Utah 84110-2550
Telephone: 801-532-1922

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